THE OFFICE OF REGULATORY STAFF

SURREBUTTAL TESTIMONY AND EXHIBITS

OF

DR. J. RANDALL WOOLRIDGE

August 14, 2006

DOCKET NO. 2006-107-WS

Application of United Utility Companies, Incorporated for Adjustment of Rates and Charges and Modification to Certain Terms and Conditions for the Provision of Water and Sewer Service

SURREBUTTAL TESTIMONY OF J. RANDALL WOOLRIDGE

FOR

THE OFFICE OF REGULATORY STAFF

DOCKET NO. 2006-107-W/S

IN RE: UNITED UTILITY COMPANIES, INC.

Q. PLEASE STATE YOUR FULL NAME, ADDRESS, AND OCCUPATION.

A. My name is J. Randall Woolridge and my business address is 120 Haymaker Circle, State College, PA 16801. I am a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration at the University Park Campus of the Pennsylvania State University.

Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS HEARING?

A. Yes. I have filed testimony on behalf of the Office of Regulatory Staff ("ORS") concerning an overall fair rate of return or cost of capital for United Utilities Companies, Inc. ("UUC" or "Company").

Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY IN THIS PROCEEDING?

A. I am addressing issues covered in the Rebuttal Testimony of UUC witness Ms. Pauline M.

Ahern and Dr. B. R. Skelton.

Q. WHAT ISSUES ARE YOU ADDRESSING IN YOUR SURREBUTTAL TESTIMONY?

A. I am evaluating the ROE – market-to-book relationship, betas and the riskiness of the water utility industry, the equity risk premium, the size premium, the DCF growth rate, the arithmetic versus geometric mean, and the ECAPM.

The ROE – Market-to-Book Relationship

Q. PLEASE EVALUATE MS. AHERN'S DISCUSSION OF THE RELEVANCE OF MARKET-TO-BOOK RATIOS.

A. In her Rebuttal Testimony Ms. Ahern discusses the relationship between return on equity and market-to-book ratios. Ms. Ahern's discussion and analysis on this topic is overly simplistic. On a day-to-day basis, stock prices are influenced by many factors in the marketplace. On some days, such factors as program trading, acquisitions, and other news events drive stock prices. However, over time, and in the context of the issues relevant in these proceedings, there is a very direct relationship between stock price, book value, and the return on and cost of equity. This relationship is discussed in a classic Harvard Business School case study entitled "A Note on Value Drivers." On page 2 of that case study, the author describes the relationship very succinctly:

For a given industry, more profitable firms – those able to generate higher returns per dollar of equity – should have higher market-to-book ratios. Conversely, firms which are unable to generate returns in excess of their cost of equity should sell for less than book value.

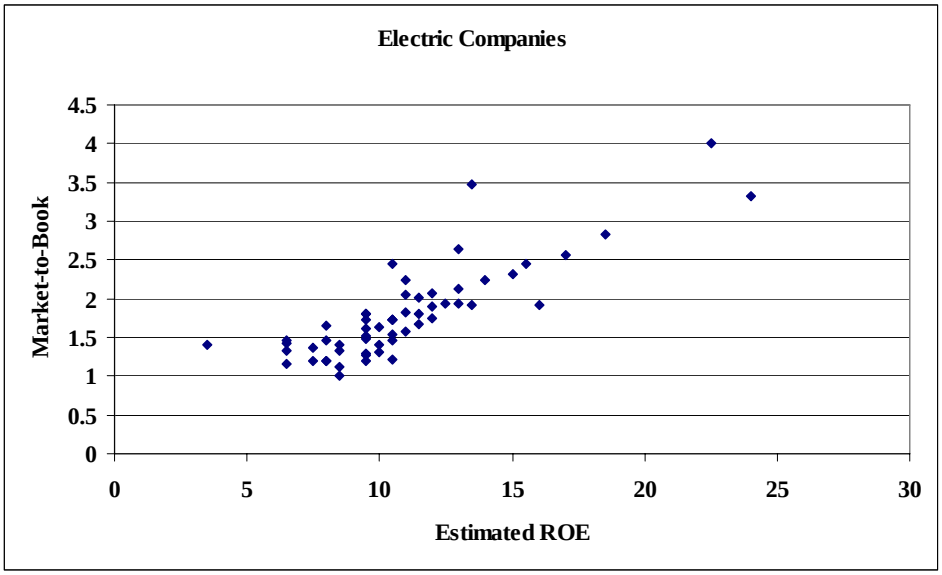
Profitability	*Value*
If ROE > K	*then Market/Book > 1*
If ROE = K	*then Market/Book =1*
If ROE < K	*then Market/Book < 1*

Ms. Ahern's discussion on pages 2-5 of her rebuttal testimony, are irrelevant to this topic. Her analysis simply indicates that, over time, market-to-book ratios of industrial firms have been in excess of 1.0 because successful firms have been earning returns on equity above their equity cost rates over time. Indeed, existing firms should be earning returns on equity in excess of their equity cost rates. Ms. Ahern's analysis suffers from the well-known "survivorship bias," which means one has considered only firms that have survived over time and are still around. Firms that cannot earn returns on equity at least as large as their equity cost rates over time will either be acquired by other companies or go out of business. Therefore, the results that Ms. Ahern presents and discusses are biased and are of no relevance.

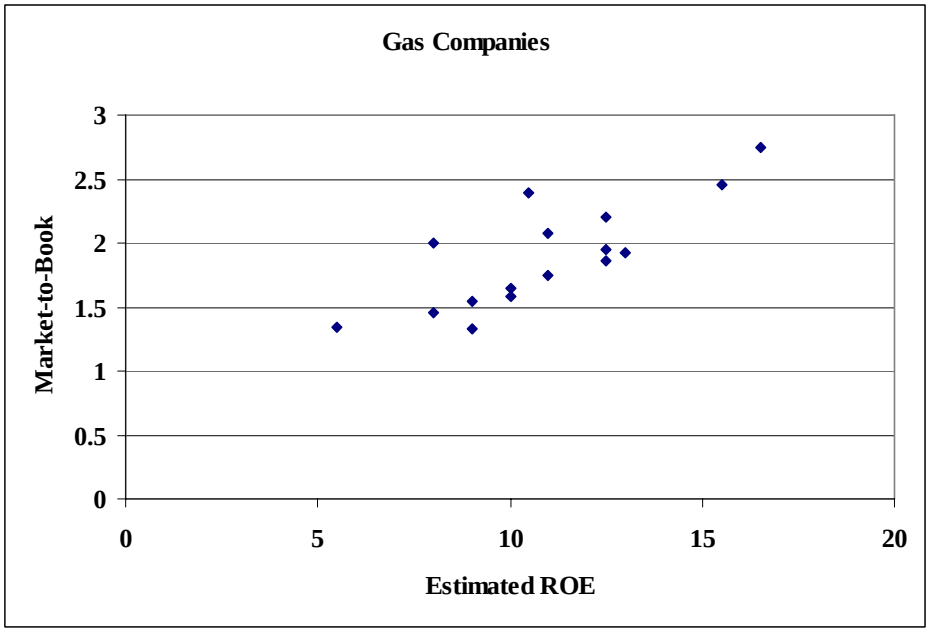
Q. ON PAGE 2 OF HER REBUTTAL TESTIMONY, MS. AHERN MAKES THE FOLLOWING STATEMENT: "IN THE COMPETITIVE ENVIRONMENT, THERE IS NO EVIDENCE OF ANY DIRECT … RELATIONSHIP BETWEEN MARKET-TO-BOOK RATIOS AND ROE." PLEASE COMMENT.

A. Ms. Ahern's comment is incorrect, reflects the flawed study discussed above, and misunderstands basic microeconomics. To demonstrate this relationship, I have performed a regression study between estimated return on equity and market-to-book ratios using all gas distribution, electric and water companies with estimated return on equity and market-to-book ratio data. The results are presented below.

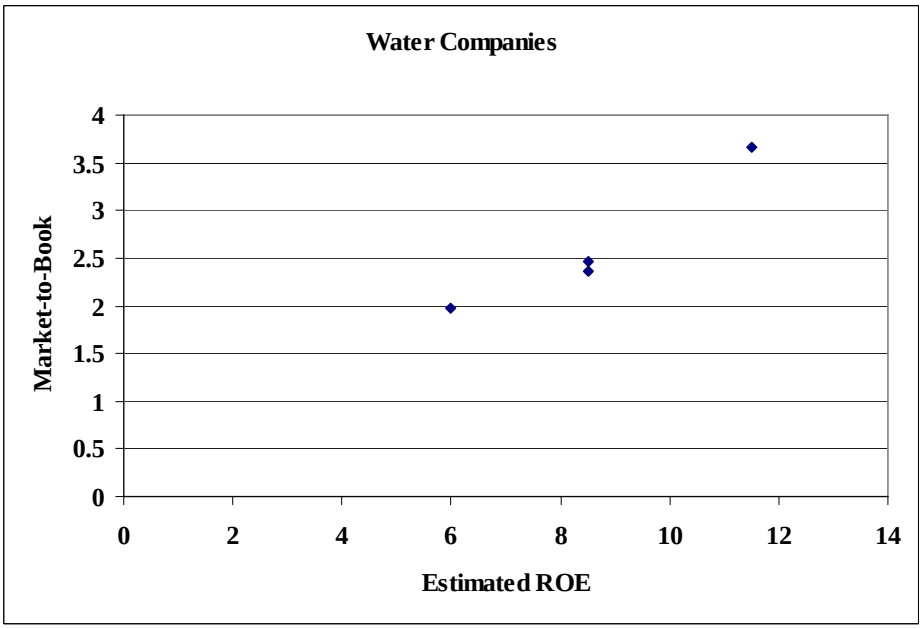
The Relationship Between Estimated ROE and Market-to-Book Ratios
Value Line Electric Companies, Gas Distribution Companies, and Water Utilities



R-Square = .70
N=58



R-Square = .64
N=16



R-Square = .93
N=4

The average R-squares for the electric, gas, and water companies are 0.70, 0.64, and 0.93. This

demonstrates the strong relationship between ROEs and market-to-book ratios.

Q. PLEASE SUMMARIZE YOUR ASSESSMENT OF THE RELATIONSHIP BETWEEN MARKET-TO-BOOK RATIOS AND ROE.

A. As indicated above, the relationship between a firm's return on equity and market-to-book ratio is relatively straightforward. Ms. Ahern's analysis of the historical relationship between returns on equity and market-to-book ratios for industrial firms is erroneous and subject to survivorship bias. Using groups of electric, natural gas, water utility companies, I demonstrate that there is a strong, positive, statistically significant relationship between return on equity and market-to-book ratios.

Betas and the Riskiness of Water Utilities

Q. ON PAGE 5 OF HER REBUTTAL TESTIMONY, MS. AHERN TAKES ISSUE WITH YOUR STUDY OF THE COMPARATIVE INVESTMENT RISK OF WATER UTILITIES AND OTHER INDUSTRIES USING BETA. PLEASE COMMENT.

A. In Exhibit (JRW-6) of my Direct Testimony, I show the comparative investment risk of the water utility industry relative to 100 other industries as measured by beta. My study indicates that the investment risk of the water utility industry is among the lowest of all industries in the U.S.

In her Rebuttal Testimony, Ms. Ahern contends that beta only measures a portion of investment risk and hence my study is flawed. However, Ms. Ahern's discussion of beta and

investment risk reflects a very basic misunderstanding of modern capital market theory. Ms. Ahern and I agree that beta is a measure of the systematic risk and that this risk cannot be diversified away. But Ms. Ahern also contends that the investment risk of a stock includes both systematic and unsystematic risk. Unsystematic risk reflects company-specific factors which can be diversified away by investors by holding a portfolio of stocks. The key principle that Ms. Ahern misses about capital market theory is this: Since investors can diversify away unsystematic risk, the market does not pay a return for it. As such, investors are not rewarded for bearing diversifiable risk, and therefore do not expect a return on diversifiable risk. Ms. Ahern tries to confuse the issue by suggesting that beta is the only relevant measure of risk with a diversified portfolio, and that for an individual company or an undiversified investor, you must also provide a return for diversifiable risk. This is incorrect.

On a more intuitive level, beta reflects the price volatility of a stock relative to the market. Stocks whose price movements are greater than the overall market are riskier than the market and have a beta greater than 1.0. Stocks with below-average price movements, such as the stocks of public utilities, are less risky than the market and have a beta less than 1.0.

The Equity Risk Premium

Q. PLEASE EVALUATE THE ISSUE REGARDING THE DECLINE IN THE EQUITY RISK PREMIUM.

A. As I discuss in my testimony, there are three approaches to estimating the equity risk premium: (1) using historical stock and bond returns, (2) developing expected market returns from fundamental data (primarily earnings and dividends), and (3) employing surveys of financial professionals. In arriving at my equity risk premium, I use all three approaches and I provide independent evidence from multiple sources regarding the decline and the size of the equity risk premium. This evidence comes from leading academic scholars, the top investment banks and consulting firms, surveys of chief financial officers (CFOs) and financial forecasters, and even former Federal Reserve Chairman Alan Greenspan. In each case, the evidence indicates a decline in the equity risk premium.

On pages 8-10 of her rebuttal testimony, Ms. Ahern attempts to critique my discussion relating to the decline in the equity risk premium by highlighting a 1998 article by Ibbotson Associates. The Ibbotson approach relies solely on historical return to estimate an equity risk premium. As discussed in my testimony, the use of historical return to estimate an expected risk premium can be erroneous because (1) ex post returns are not the same as ex ante expectations, (2) market risk premiums can change over time, increasing when investors become more risk-averse, and decreasing when investors become less risk-averse, and (3) market conditions can

change such that ex post historical returns are poor estimates of ex ante expectations. Furthermore, there are a number of flaws in using historical returns over long time periods to estimate expected equity risk premiums. These issues, as discussed in my testimony, include: (1) Biased historical bond returns; (2) the arithmetic versus the geometric mean return; (3) unattainable and biased historical stock returns; (4) survivorship bias; (5) the "Peso Problem;" (6) market conditions today are significantly different than the past; and (7) changes in risk and return in the markets.

Q. ON PAGES 6-7 OF HER REBUTTAL TESTIMONY MS. AHERN TAKES EXCEPTION TO YOUR 'BUILDING BLOCKS' APPROACH TO ESTIMATING AN EQUITY RISK PREMIUM. PLEASE COMMENT.

A. Ms. Ahern suggests that Ibbotson Associates *2006 Yearbook* provides a equity risk premium of 7.1% using the 'Building Blocks' approach to estimating an equity risk premium. The error in this case is that Ibbotson uses a historical "Building Blocks" approach which employs historical data as inputs. For example, the current dividend yield in the market is 1.9%. However, the historical dividend yield in the Ibbotson approach is 4.4%. By ignoring current market conditions, this factor alone inflates the equity risk premium by 2.5%.

Q. DO YOU HAVE ANY FINAL COMMENTS ON THE APPROPRIATE EQUITY RISK PREMIUM?

A. Yes. The spring 2006 Duke/*CFO Magazine* Survey was just released June 8th.[1] The CFOs who respond to this survey expect an equity risk premium of 3.05% over the 10-year Treasury yield. It is clear that those in the marketplace who use equity risk premiums for investment and financing decision-making, such as CFOs, investment banks, and consulting firms, have a much different view of the appropriate equity risk premium than Ms. Ahern.

The Size / Business Risk Premium

Q. PLEASE RESPOND TO MS. AHERN'S UPDATED SIZE PREMIUM ANALYSIS FOUND ON PAGES 11-14 OF HER REBUTTAL TESTIMONY.

A. To support her size premium adjustment, Ms. Ahern provides an additional analysis using Ibbotson Associates data. There are several problems with the reference to the Ibbotson study. First, it is based entirely on historical returns, and therefore suffers from all the problems outlined above in using historical returns to estimate a risk premium. Second, and most importantly, the size premium she cites from the study is for a group of stocks that are riskier than water

[1] See www.cfosurvey.org.

utility companies. Furthermore, as noted in my direct testimony, a study by Professor Annie Wong found that size premiums did not apply to utilities.[2]

Q. PLEASE ADDRESS MS AHERN'S RESPONSE TO YOUR ASSESSMENT OF HER BUSINESS RISK ADJUSTMENT.

A. Ms. Ahern developed her business risk adjustment based on a historical stock return study by Ibbotson Associates. In this study, returns on stocks ranked in the 10th decile by size produced a return in excess of expectations. My response was that the companies in the 10th decile have a beta of 1.41 which is about double the average beta for water companies. Therefore, these are obviously not companies with the investment risk profile of water utilities. On page 17 of her rebuttal testimony, Ms. Ahern argues that my comparison of betas is erroneous since the time periods over which the betas were calculated are not the same. Mr. Ahern's argument is without merit. Regardless of the time period over which a beta is calculated, water companies do not have betas anywhere near 1.41. The bottom line is that the water utility business has been a very low investment risk business for a long time and certainly does not have a beta approaching 1.41.

[2] Annie Wong, "Utility Stocks and the Size Effect: An Empirical Analysis," *Journal of the Midwest Finance Association*, 1993, pp. 95-101.

DCF Growth Rate

Q. PLEASE DISCUSS MS. AHERN'S EVALUATION OF THE UPWARD BIAS IN ANALYSTS' EPS GROWTH RATE FORECASTS.

A. In my Direct Testimony, I provide empirical evidence demonstrating an upward bias in analysts' EPS growth rate forecasts. In response, Ms. Ahern produces no empirical proof against the obvious upward bias in analysts' EPS forecasts. She does provide several quotations from university professors as well as an excerpt from a speech by a Director of the SEC which highlights changes in rules and compliance that are aimed at eliminating conflicts of interest for analysts. First, with respect to the quotations from the academics, none of these are supported by any empirical studies negating the existence that I demonstrate of an upward bias in analysts' EPS growth rate forecasts. Second, Ms. Ahern's presumption that the new SEC rules have eliminated the upward bias in analysts' EPS growth rate forecasts is misguided and incorrect. On this issue, it should be noted that the *Wall Street Journal* article referenced in my direct testimony,[3] highlighting the continued upward bias in analysts' growth rate forecasts, was published after the change in the SEC rules and after the speech cited by Ms. Ahern. In addition and more importantly, as discussed in my testimony, the average long-term EPS growth rate projected by analysts is still about 15% -- about double the actual historical growth rate of U.S. companies.

[3] Ken Brown, "Analysts Still Coming Up Rosy – Over-Optimism on Growth Rates is Rampant – and the Estimates Help to Buoy the Market's Valuation." *Wall Street Journal*, (January 27, 2003), p. C1.

Q. PLEASE ASSESS MS. AHERN'S COMMENTS REGARDING YOUR EXAMINATION OF *VALUE LINE* PROJECTIONS.

A. In my Direct Testimony, I also provide empirical evidence illustrating that *Value Line*'s projections of both EPS growth rates and stock returns tend to be overly optimistic. A significant factor in the inflated projections is that *Value Line* rarely forecasts negative EPS growth rates and stock returns. In response, Ms. Ahern states: "Whether such forecasts have been accurate is irrelevant." Such a statement contrasts with Ms. Ahern's belief in the Efficient Market Hypothesis (EMH). Under EMH, investors would recognize the bias in *Value Line* projected EPS growth rates and stock returns and moderate their growth rate and stock return expectations in recognition of the tendency for *Value Line* to provide inflated forecasts.

Arithmetic versus Geometric Mean Returns

Q. MS. AHERN ALSO ARGUES FOR USING THE ARITHMETIC MEAN RETURN IN EVALUATING HISTORICAL RETURNS. PLEASE RESPOND.

A. As shown on page 3 of Exhibit (JRW-8), I use both arithmetic and geometric mean returns in assessing stock and bond returns. In my direct testimony I discussed this issue and presented an example to highlight the problem with the arithmetic mean return. As further evidence as to the appropriate mean return measure, the U.S. Securities and Exchange Commission requires equity mutual funds to report historical return performance using

geometric mean and not arithmetic mean returns.[4]

ECAPM

Q. MS. AHERN HAS CLAIMED THAT YOU HAVE MISREPRESENTED DR. MORIN'S 'EVIDENCE' REGARDING THE ECAPM. PLEASE COMMENT.

A. I have not misrepresented Dr. Morin's 'evidence' on the ECAPM. First, I agree that tests of the CAPM have indicated the Security Market Line (SML) is not as steep as predicted by the CAPM. However, none of these tests use adjusted betas (such as those used by Ms. Ahern and myself) which address the empirical issues with the SML. Furthermore, a SML with a slope coefficient which is not as steep as predicted by the CAPM is also consistent with a declining equity risk premium. Moreover, my testimony shows I have provided plenty of empirical evidence regarding the decline in the equity risk premium.

Q. FINALLY PLEASE ADDRESS DR. SKELTON'S ASSERTION THAT YOUR ROE RANGE IS TOO LOW FOR UUC?

A. Dr. Skelton contends that my ROE range is too low primarily by citing a recent case involving Transylvania Utilities, Inc. in North Carolina. The ROE in the North Carolina case was 10.7%. I must disagree with Dr. Skelton's contention for two reasons. First, the North Carolina case was a settlement as opposed to a litigated case and therefore the allowed ROE is part of the settlement involving compromises on a number of issues. Second, my range is consistent with the South Carolina PSC decision in the Carolina Water Company case in Docket

[4] U.S. Securities and Exchange Commission, Form N-1A.

No. 2004-357-WS. In that case, the allowed ROE was 9.10%.

Q. DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?

A. Yes.